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defined by the cranial characters alone. The resemblance of the larval *Ichthyophis* to *Amphiuma* is after all superficial, and although, as I believe, the *Apoda* and *Caudata* may have evolved from a common stock, *Amphiuma* is certainly not the connecting form between the two as Prof. Cope would have it, for we cannot well assume the scales, lost in the *Urodeles*, to have reappeared in the *Cæcilians*."

The above discussion is interesting but troublesome, because it requires a reply. In the first place, it ought not to be necessary to remark that the presence or absence of scales in the *Batrachia* is not an ordinal character. On the page following that from which the above is quoted, Boulenger states that six of the sixteen genera of *Apoda* (*Cæciliidæ*) *have no scales*. Further, among the extinct *Stegocephalia* some genera have scales and some have none, so there is reason to suppose that scales may be secondary as well as primary. Moreover, if a genus of salamanders should be discovered which possesses scales, no one would think of removing it from the *Urodela* on that account. There is no improbability in the supposition that such a genus may not be found in some of the Mesozoic formations. Second, Prof. Cope has never stated that the genus *Amphiuma* is the connecting form between the *Apoda* and *Caudata*. He has said that the *Amphiumoidea* probably are, and possibly the *Amphiumidæ*, but the genus *Amphiuma* never.¹ He has very rarely alleged that any genus is ancestral to any other genus. There can be no one genus between these two groups, for there is room for several genera. And one may agree with Dr. Boulenger that the *Apoda* and *Caudata* have had a common ancestor, and not disagree with the position that the *Apoda* belong to the *Caudata*, for there is no reason why that common ancestor may not probably have been one of the *Caudata*, unless there is more difference in the cranial characters of the two than has been yet pointed out.—E. D. COPE.

ENTOMOLOGY.²

Heterocera of the Lesser Antilles.—Reporting on a collection of *Geometridæ* and allied families from the islands of Grenada, St. Vincent and the Grenadines, Mr. G. F. Hampson³ says. The *Geometridæ*

¹ *Batrachia* of N. America, 1889, pp. 34-222.

² Edited by Clarence M. Weed, Durham, N. H.

³ *Ann. and Mag. Nat. Hist.*, XVI, 329.

are represented by very few species in the Lesser Antilles compared with the large number that exist in other parts of the Neotropical Region both north and south of the isthmus; and almost all the species are identical with those found on the mainland.

The Pyralidæ are represented by a much greater diversity of species; but these, as in other parts of the world, are very wide ranging, most of the species being also found in Brazil and Venezuela, some being identical with forms found in the United States, whilst others range down to Chili; others again being spread throughout nearly the whole tropical zone; whilst, even of the species described as new, several are represented in the British Museum or other collections by specimens from continental localities.

Bot Flies of the Horse.—Prof. H. Garman publishes³ an interesting account of the habits of oviposition of *Gastrophilus nasalis* and *G. equi*. He enumerates five species of bot flies attacking the horse in America; the adults may be distinguished by the following key:

- 1 (6) Discoidal cell closed by a cross vein.
- 2 (3) Wings marked with brown *G. equi*.
- 3 (2) Wings not marked with brown.
- 4 (5) Anterior basal cell nearly or quite equal to the discoidal cell
in length *G. nasalis*.
- 5 (4) Anterior basal cell markedly shorter than the discoidal cell
[*G. hæmorrhoidalis*.
- 6 (1) Discoidal cell not closed *G. pecorum*.

Concerning the habits and life history of *G. equi*, the most abundant species, Professor Garman writes:

This fly buzzes about horses during the hot summer days, occasionally alighting on their bodies, and when an opportunity offers, placing its eggs in the hairs on the inside of the knee, on the shoulders, and sometimes even on the mane. Its mouth-parts are in a rudimentary condition, and it can not, even if it were disposed to, do any injury to horses.

It is probable that the grubs recently hatched from the eggs of this fly are taken into the mouths of horses on the lips or tongue. I am told by a gentleman who has had much experience with horses that he has on many occasions taken the eggs between the moistened palms of his hands, and in a few moments felt the young grubs wriggling about. It appears that moisture accelerates the hatching of the eggs, and it is just possible that many eggs would never hatch at all if the eggshell

³ 7th Rept. Kentucky, Agr. Exp. Station.

was not moistened in some way. Whether this must be from the horse's tongue or lips in all cases is a question which may be considered not yet settled. Professor H. Osborn, of Iowa, is disposed to believe that the young do not hatch unless moistened by the horse's tongue; that the young grubs generally die in the eggs if left for 35 to 40 days; and that they are not commonly ready to hatch until from 10 to 12 days after the eggs are laid.

Fossil Butterflies.—Fossil butterflies are the greatest of rarities. They occur only in tertiary deposits, and out of the myriads of objects that have been exhumed from these beds in Europe and America less than twenty specimens have been found. The great body of these deposits is of course of marine origin, but at least thirty thousand specimens of insects have been recovered from those beds which are not marine. Over fifty thousand insects from the one small ancient lake of Florissant, high up in the Colorado Parks have passed through my hands, yet I have seen from them but eight butterflies. Each of these belongs to a genus distinct from the others, as is also the case with all or all but one, of the butterflies found at Radoboj, at Aix, and at Rott in the European tertiaries. With two (European) exceptions, each represents an extinct genus, and these two exceptions, *Eugonia* and *Pontia*, are genera found to-day both in Europe and America. The species, however, are all extinct.

One would hardly expect that creatures so delicate as butterflies could be preserved in a recognizable state in deposits of hardened mud and clay. Yet not only is this the case, but they are generally preserved in such fair condition that the course of the nervures and the color patterns of the wings can be determined, and even, in one case, the scales may be studied. As a rule they are so well preserved that we may feel nearly as confident concerning their affinities with those now living as if we had pinned specimens to examine; and generally speaking the older they are the better they are preserved.—*S. H. Scudder in Frail Children of the Air.*

Origin of European Butterflies.—Mr. W. H. Bath in discussing⁴ the effects produced by the glacial period upon the distribution and diversity of European butterflies says: As the result of his investigations Ernest Hoffmann asserts that of the 290 species of *Rhopalocera* inhabiting our continent at the present time, no less than 173 were originally derived from Siberia. If this was the case, and it seems very

⁴ The Entomologist, XXVIII, 247.

likely to be correct, the majority of them probably immigrated westwards of the commencement of the pleistocene periods, for they must be of great antiquity; moreover it is unreasonable to suppose that many of the species could have existed also in the south of Europe, even at the climax of the glacial period. According to the same authority only 8 species have been derived from Africa, and 39 from Asia south of Siberia. These must have immigrated into the south European province of the palearctic region after the termination of the glacial period as they belong to genera and types of tropical distribution. At the present day they occur in those countries bordering on the Mediterranean Sea.

The glacial species of butterflies—that is the most ancient forms, designated by Weismann “the original stirps”—are in many cases distinguished by their melanic and melanochoic tendencies. We thus find the forms inhabiting the more northern localities and the higher elevations on the mountains often of a darker hue, while their representatives in more southern latitudes and less elevated altitudes exhibit a brighter coloration.

North American Aphelininæ.—As the first of a technical series of bulletins to be issued by the Division of Entomology of the U. S. Department of Agriculture, Mr. L. O. Howard publishes a Revision of the Aphelininæ of North America. Regarding the biology of the group Mr. Howard writes: The insects of this subfamily are all, so far as we know, parasitic either upon the Coccidæ, Aleyrodidæ, or Aphididæ. They are evidently many brooded, and issue from their hosts indifferently throughout the warmer months of the year, and through the winter on the insectary. With the Aleyrodidæ, Aphididæ, and the Diaspinæ among the Coccidæ, but one specimen apparently issues from a single host. Sufficient observations have not been made upon the early stages of the Aphelininæ. Their larvæ feed both upon the body of the scale insect and upon the eggs. They attack both sexes of the host, issuing when full-grown through circular holes, cut through the body walls, and, in the case of the Diaspinæ through the scale. With the scale insects of the genus *Pulvinaria*, the aphelinine larvæ live within the body of the female and not in the waxy egg mass which she secretes.

News.—A List of Night-flying Moths from Kentucky, is published by Prof. H. Garman in the 7th Report of the Experiment Station of that State.

An extended account of the life-history of *Phryganidia californica* Packard is published by Messrs. V. L. Kellogg and T. J. Jack in the Proceedings California Academy of Sciences (Ser. 2, V, 562-570.)

Prof. J. B. Smith issues as Bulletin 111 of the New Jersey Experiment Station an account of experiments with "Raupenlime" and "Dendrolene," substances useful for applying to tree trunks to keep out borers.

PSYCHOLOGY.¹

American Psychological Association.—The American Psychological Association held its annual meeting this year at the University of Pennsylvania, in connection with the meetings of the scientific societies affiliated with the American Society of Naturalists. Hitherto the Psychological Association has met independently, but the feeling has been growing that the close relation between the more recent forms of psychology and the biological sciences made it eminently suitable and desirable that their representatives should be brought together. The success which has attended this first step makes it probable that the policy will be continued in future.

No official outline of the proceedings of the Psychological Association is at hand, and any account written from memory will be more or less defective. Consequently the present writer must beg indulgence from those whose words he endeavors to report if he has, in any case, misrepresented them. On the whole, however, he believes he is giving a fair outline of the more important points.

At the first session, on Friday, Dec. 27th, the opening paper, on "Physiology and Psychology," was read by Prof. George S. Fullerton of the University of Pennsylvania. Two years ago, at the New York meeting of the Association, Prof. Fullerton outlined the relation in which psychology as a natural science stands to metaphysic, and concluded that psychology should adopt, as far as possible, the methods and assumptions of the other natural sciences, and should relegate the task of criticising those assumptions to a distinct science—that of metaphysic. The paper read this year was a continuation of the same general line of thought in the investigation of the relations of psychology and physiology. Taking Foster's "Physiology" as a standard, we find, said Prof. Fullerton, that the author is absolutely unable to give any

¹ This department is edited by Dr. Wm. Romaine Newbold, University of Pennsylvania.